ADSORPTIVE TREATMENT OF TEXTILE WASTEWATER USING ACTIVATED CARBON PREPARED FROM PANDANUS AMARYLLIFOLIUS STEMS AND ARECA CATECHU FRONDS

by

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LIST OF ABBREVIATIONS

AC	Activated carbon
AOP	Advanced Oxidation Process
ANOVA	Analysis of Variance
APHA	American Public Health Association
BOD	Biochemical Oxygen Demand
BET	Brunauer-Emmett-Teller
CCD	Central Composite Design
COD	Chemical Oxygen Demand
FTIR	Fourier Transform Infrared
GAC	Granular Activated Carbon
HRT	Hydraulic Retention Time
IR	Impregnation Ratio
IUPAC	International Union of Pure and Applied Chemistry
MB	Methylene Blue
MR	Methyl Red
MSDS	Material Safety Data Sheet
MTZ	Mass Transfer Zone
N	Total Number of Sample
NCB	Nano Carbon Bead
NF	Nanofiltration
OFAT	One Factor at Time
PAC	Powder Activated Carbon
PACl	Polyaluminium Chloride
PBBR	Pebble Bed Photocatalytic Reactor
PSAC	Pandanus Amaryllifolius Stems Activated Carbon
PFAC	Pinang Fronds Activated Carbon
RBV	Remazol Brilliant Violet 5R
RO	Reverse Osmosis
RO/NF	Reverse Osmosis/Nanofiltration
RSM	Response Surface Methodology

SEM	Scanning Electron Microscopy
STA	Simultaneous Thermogravimetric Analyser
UF	Ultrafiltration
UV	Ultraviolet

LIST OF SYMBOLS

		Unit
A	Arrhenius factor	-
A_i	Measured absorbance for component i	-
C	Solute/outlet concentration	mg/L
C_e	Concentration of adsorbate at equilibrium	mg/L
C_i	Constant for Intraparticle diffusion model	mg/g
C_t	Concentration of adsorbate at time, t	mg/L
C_o	Initial/inlet adsorbate concentration	mg/L
D_p	Average pore diameter	nm
E_a	Arrhenius activation energy of adsorption	kJ/mol
F	Fraction of solute adsorbed for Boyd model	-
K_F	Adsorption or distribution coefficient for Freundlich isotherm	mg/g $(L/mg)^{1/n}$
K_L	Rate of adsorption for Langmuir isotherm	L/mg
k_{Av}	Avrami kinetic constant	-
k_{pi}	Adsorption rate constant for intraparticle diffusion model	mg/g $h^{1/2}$
k_1	Adsorption rate constant for pseudo-first-order	1/h
k_2	Adsorption rate constant for pseudo-second-order	g/mg h
N	Total number of experiments required/data point	-
n_{Av}	Avrami kinetic constant	-
n_F	Constant for Freundlich isotherm	-
n_{KC}	Adsorption intensity Koble-Corrigan isotherm	-
n_{To}	Toth constant	mg/g
Q_o	Adsorption capacity for Langmuir isotherm	mg/g
Q_m	Maximum adsorption capacity of adsorbent	mg/g
q_e	Amount of adsorbate adsorbed per unit mass of adsorbent at equilibrium	mg/g
q_t	Amount of adsorbate adsorbed per unit mass of adsorbent at time, t	mg/g
$q_{t,\,cal}$	Calculated adsorption uptake at time, t	mg/g

$q_{t,\,exp}$	Experimental adsorption uptake at time, t	mg/g
R	Universal gas constant	8.314 J/mol K
R_L	Separation factor	-
R^2	Correlation coefficient	-
S_{BET}	BET surface area	m^2/g
T	Absolute temperature	K
T	Time	h
V	Volume of the solution	L
V_{meso}	Mesopore volume	cm^3/g
V_T	Total pore volume	cm^3/g
W	Mass of adsorbent	g
w_c	Dry weight of prepared activated carbon	g
w_o	Dry weight of precursor	g
	Dry weight of sodium carbonate	g
X	Activated carbon preparation variable	-
Y	Predicted response	-

Greek letters

ΔG^o	Changes in standard free energy	kJ/mol
ΔH^o	Changes in standard enthalpy	kJ/mol
Δq_t	Normalized standard deviation	%
ΔS^o	Changes in standard entropy	J/mol K
α_{El}	initial desorption rate for Elovich kinetic model	mg/(g min)
α_t	adsorption fraction of time of Avrami kinetic model	-
Λ *or* λ	Wavelength	nm
β_{El}	desorption constant for Elovich kinetic model	g/mg